APPENDIX F

ATLANTIC RIM DATA SUBMISSION AND MONITORING REQUIREMENTS - BLUE SKY POD

ATLANTIC RIM DATA SUBMISSION AND MONITORING REQUIREMENTS

GEOLOGIC AND COAL INFORMATION REQUIRED TO BE SUBMITTED BY OPERATORS DURING INTERIM DRILLING ACTIVITIES

The geologic and coal information needs identified below are those that the Reservoir Management Group, in consultation with the United States Geologic Survey, has determined are needed based on their experience with coalbed methane development in the Powder River Basin. The information will be used to define the potential gas resource and provide valuable data for the NEPA assessment including the determination of future development potential.

1. Operators will provide copies of all geologic information obtained to the Rawlins Field Office and the Reservoir Management Group as required under 43 CFR 3162.4.

2. The suite of logs required to evaluate coal beds in the project area are high resolution gamma ray, resistivity, density, and neutron logs. The full suite will be required during this phase but may be reviewed for changes during any later drilling phase.

3. Detailed geologic and coal information will be required and obtained for a minimum of one well within each of the nine pods. Information required includes; coal cores, fluid level, and production an analysis. From this data information can be obtained on coal rank, adsorption and desorption gas content, core density, specific gravity, orientation of cleats and joints, initial saturations, coal permeability, and desorption pressure.

4. Initial reservoir pressure for each pod drilled.

5. Agree to standard stratigraphic nomenclature for all operators to use in preparing reports to the BLM and Wyoming Oil and Gas Conservation Commission.

6. Obtain an initial reservoir pressure for each coal bed in three of the pods.

7. Obtain reservoir pressure at the end of one year and two years, for each coal bed in three of the pods.

WATER ASSESSMENT/MONITORING DATA NEEDS

Recognizing that surface and ground water resources can be affected by large coalbed methane drilling projects, the following data submission requirements will be necessary to complete the assessment of impacts and develop baseline water conditions. Also water monitoring data has been found to be vital when reviewing drainage situations.

1. The operator(s) will obtain aquifer hydraulic baseline data for all pods in the initial exploration phase. This will include hydraulic conductivity and storativity derived from a multiple well pumping test conducted at each pod. This information could be used to provide data for the NEP A document and to assess monitoring needs for full field development.

2. Identify all domestic/industrial wells in the area and make a baseline and annual measurement of each.

3. Prepare a well mitigation agreement for existing wells and offer it to all groundwater appropriators in the vicinity.

4. Monitoring wells need to be installed both in an updip and downdip direction, completed in coal and overburden, from the pods selected. Details of this requirement will be done in coordination with the Rawlins Field Office hydrologist.

5. Measure initial static water levels in all production wells.

6. Collect water quality analyses for each pod.

7. Each well must have a continuous flow meter installed to measure water production rates for the duration of the project. All water production data will be furnished to the Bureau.

8. Baseline surface water quality should be collected in each stream or receiving water that will collect or transport discharge water. The analysis will include all BLM category I, II and III constituents.

9. The operator will provide to BLM a geologic map of the area/watershed where the produced water is to be re-injected. This should include surficial and bedrock geology, with a clear definition of recharge zones of the receiving formation/unit. The pre-injection water levels and water quality should be monitored and that data provided to BLM. The receiving aquifer should be pump tested and aquifer hydraulics reported to BLM. The reported parameters will include hydraulic conductivity, water levels and storativity for each receiving aquifer.

REVISED MONITORING REQUIREMENTS

3181
(3181.1)
Sun Dog (CBM)
WYW152954X

Petroleum Development Corporation
c/o Ken Gobble
801 East 4th St/. Suite 23
Gillette, Wyoming 82716

JAN 14 2002

Dear Mr. Gobble:

Thank you for making your presentation on November 20, 2001 to our staff regarding groundwater monitoring well and coring requirements for the Sun Dog CBM and similar CBM units on the Atlantic Rim area and for the Interim Drilling Policy approved by the Rawlins Field Office. We reviewed your proposal of December 7, 2001 in response to our meeting regarding groundwater-monitoring wells. We agree that there are four distinct groups of coalbeds in the Mesaverde Formation in the Atlantic Rims area and that there are three distinct geologic settings for this area. We have added additional information to your description of these three areas as follows:

1. The Mesaverde coalbeds in this area crop out on Atlantic Rim between the middle of T. 18 N., R. 89-90 W.; T. 19 N., R. 88-89 W.; and T. 20 N., R. 88 W. Dips are as much as 16 degrees west in this area. Tract-delineation information for the Atlantic Rim Coal Area prepared for the 1984 coal lease sale, indicates that the rocks in T. 18 N., R. 89-90 W. dip from 8 to 12 degrees northwest, with an average dip of 10 degrees. The reports indicate that the gentlest dips are found along the north and south margins and increase in the middle along a major fault. A significant east-west trending normal fault may be considered the southern boundary of this area (Geologic Map of Wyoming, 1985 and PeDCo's regional structure map submitted with the Sun Dog, et. al. CBM units). The net coal thickness is less in this area than to the south. Average annual precipitation in the area is between 7 and 9 inches (USDA, SCS, Map M7-EN-22902) but owing to the orographic effect along Atlantic Rim may be closer to 10 inches. Based on the steep dips, small surface exposure, and low precipitation, recharge rates will be low.

2. The Mesaverde coalbeds in this area crop out on Atlantic Rim between the middle of T. 18 N., R. 89-90 W.; T. 17 N., R. 90 W.; T. 16 N., R. 89-92 W.; and T. 15 N., R. 89-92 W. Dips are mostly 2 to 4 degrees west in this area but locally dips are interrupted by small domes and anticlines. The crop area of these rocks is 8 to 10 miles wide (Geologic Map of Wyoming, 1985 and PeDCo's regional structure map

submitted with the Sun Dog, et. al. CBM units). Average annual precipitation in the area is between 10 and 14 inches (USDA, SCS, Map M7-EN-22902) but owing to the orographic effect along Atlantic Rim may be closer to the higher value of 14 inches. Based on the areal extent of the surface exposure and higher precipitation, recharge rates will be higher.

3. The Mesaverde coalbeds in this area crop out on Atlantic Rim between T. 14 N., R. 88-90 W. and T. 13 N., R. 87-89 W. Dips are 2 to 4 degrees west in this area. The crop area of these rocks is 12 to 15 miles wide (Geologic Map of Wyoming, 1985 and PeDCo's regional structure map submitted with the Sun Dog, et. al. CBM units); locally the Mesaverde Formation is overlain unconformably with high permeability Tertiary Miocene rocks (North Park Formation?). Average annual precipitation in the area is as much as 20 inches (USDA, SCS, Map M7-EN-22902). Based on the areal extent of the surface exposure, potential contact with higher permeability rocks, and higher precipitation, recharge rates will be even higher than in the first two areas..

We are in agreement with items I - VII in your letter. However, only items I, II, III, and V and new items VIII and IX should be made part of the INTERIM DRILLING POLICY (ATTACHMENT 1) as amended:

1. Item I shall be amended as follows "One pod in each distinct geologic setting will be selected for monitoring reservoir pressures with the required monitoring well program. The location of wells used in monitoring reservoir pressures will be determine through discussion with, and approval by, the Reservoir Management Group and the Rawlins Field Office".

2. Item II stands as written

3. Item III. shall also include the following statement: "Data collected in each interval of the multiple completion groundwater monitoring well shall include an initial, four-hour, formation-pressure measurement for each perforated interval. Subsequent, periodic pressure measurements for each perforated interval will be of at least a two-hour duration unless the interval has been open for more than two hours or if pressure buildup or decline data suggest a different time interval".

4. Item V. shall also include the following statement: 'The shut-in period shall be 24-hour in duration unless buildup data suggest shorter shut-in periods. The pressures will be recorded using a bottom-hole pressure bomb or by a device of equivalent accuracy".

5. Add Item VIII. as follows: "An initial, properly collected and preserved, water-quality sample shall be obtained from each perforated interval for chemical analysis. The chemical analyses shall include all constituents listed in attachment 1".

6. Add Item IX. as follows: "In the event that the three (3) perforated zones (a sandstone aquifer below the producing coal, the producing coal, and a sandstone aquifer above the producing coal) are not effectively isolated by the multiple completion, we may require additional groundwater monitoring wells".

In addition, items I - VII and new items VIII and IX will be applied to the Sun Dog (CBM) Unit, and/or future units in the Atlantic Rim Area as (ADDITIONAL OBLIGATIONS, 9(c)). Amendments to the Sun Dog (CBM) Unit will be addressed in an amended designation letter.

Please call Roger Miller at 307-261-7630, if you have any questions.

Sincerely,

/S/ KURT J. KOTTER

Kurt Kotter
Rawlins Field Office Manager

Asghar Shariff
Chief, Reservoir Management Group

Attachment -
Analysis constituents for CBM groundwater monitoring wells in Atlantic Rim Area

cc: Petroleum Development Corporation
c/o Bonita L. Limpus Jones
P.O. Box 8309
Roswell, New Mexico 88202-8309

DSD, Lands and Minerals (920)
Manager, RFO

bcc: Mike Brogan, CFO
Joe Meyer, CFO
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Clare Miller, RFO